Hot: The SYNCOM®Plus Process from the MARTIN Co.

# CUTEC NEWS

FACTS · INFORMATION · ANALYSES

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## Relatively hot

If you were in Germany this year, you must have had, without doubt, many days of very high temperatures. The outside temperature often rose to about 30 °C. However, such temperatures do not bother a technician working at high temperature because his milieu operates from about 600 °C. Many processes in primary industry, for example, operate between 1200 and 1600 °C. Hence, the term "hot" is relative and should always be referred to the respective "standard". Temperatures of 30 °C are relatively high in comparison with the average outside temperatures in central Europe while 1500 °C is the usual temperature for molten iron from a blast furnace.

A hot current topic, in all respects, can be seen on page 3 where the process of waste incineration and especially the improvement on the ash quality to improve its material utilisation potential is presented. Can this perhaps be a future approach, not only for Japan, but also for Germany or other countries?

It was also hot during our visit to the Nigerian President (we reported on that in a special edition) and during our participation at the international trade fair in Doha, State of Qatar (the report is also on this page).

Let me return to the headline on relativity. Nowadays, everybody talks about the emission trading with, for example, carbon dioxide certificates ($CO_2$ trading). Whoever emits more pays (i.e. purchase of $CO_2$ options) while others who emit below limit sell. However, we must first of all ask ourselves where the minimal possible $CO_2$ emissions in a process lie. Let us take the blast furnace process in pig iron production as an example. The theoretical low limit is predetermined by the thermodynamic equilibrium. Lower values are impossible. The actual $CO_2$ emission should be based on the low limit in order to determine the efficiency of individual process. Moreover, the more you approach the optimum during the process, the more elaborate and expensive is the reduction in $CO_2$ emission per percent. Hence, all must be considered relatively. The city of Clausthal has high potentials on this subject: The Technical University, on one hand, considers technologies for primary industry as part of its major activity with $CO_2$ trading, which plays a vital role in the economic sciences curricula of the university. On the other hand, the CUTEC-Institut has taken a new orientation for this purpose through its department for Environmental Economics, Environmental Law, and Technology Appraisal. We shall soon report on this in our future edition.

Yours sincerely

Otto Carlowitz

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## CUTEC at the Exposition in Doha

CUTEC participated for the first time at an exposition in the Near East at the beginning of October. The QWETEX Exposition, an industrial fair in the field of water and energy, was held in Doha, the capital of Katar. Katar is located on a peninsula in the Persian Gulf between Bahrain and the United Arab Emirates. The country is highly interested in western technology. At this exposition, which is organised by high-level representatives of the country, CUTEC presented its latest research results in the field of environmental engineering in a highly personal manner to an international public. In numerous conversations with the visitors to the exhibit, valuable contacts have been established for future cooperation in this region. Interest was focused especially on the fields of environmental damage remediation in the oil and gas industry, water and sewage treatment, waste treatment, environmental impact analysis, and training. (he/wes)

## International Sales Meeting 2003

During the period from 23rd to 26th September, Sympatec GmbH held its "International Sales Meeting 2003" in the CUTEC building with participants from many countries. The talks presented in the morning covered the current range of products in the field of particle measuring technology as well as sales and distribution of these products. The talks were followed by practicals outside of CUTEC premises in Clausthal and Goslar in the afternoon. (he)

## Waste: A Cost Factor in the Net-Value-Added Chain

In view of the new legislation relating to waste, which is scheduled for 2005, CUTEC and the Technical University of Clausthal invited companies from the Goslar region to attend a half-day seminar. Expert speakers reported on the legal changes and presented examples of production-integrated avoidance of waste, recycling and re-use. (vd)

# CUTEC Patent Granted in Germany and the United States

During the past month we have received the welcome announcement that a German patent has been granted for a process developed at CUTEC for reducing the amount of sewage sludge. By means of this process, the amount of organic components can be minimised economically by increasing the production of sludge digestion gas. An application for a patent had already been filed in 1999 (DE 199 40 994 A1).

The economical advantages of the process have been demonstrated on a pilot-plant scale and have resulted in several years of international industrial cooperation with Invensys Waste Technology (IWT, formerly APV). The objective was the development of a finished product with an application on an industrial scale. The name of the product is BIOFROS and stands for "BIOgas FROm Sludge". The innovative feature of BIOFROS is the thickening of the completely digested sludge, followed by treatment in a high-pressure homogeniser and repeated digestion. Furthermore, IWT has developed a new high-pressure homogeniser which is specially designed for the physical properties of sewage sludge.

For the United States, the unusual procedure of direct application without a previous PCT application (Patent Cooperation Treaty) was chosen in 2000. Consequently, the US patent had already been granted last year.

With the granting of the German patent, the necessary conditions have now been created for granting of further international patents in Europe, Australia, and Asia. This constitutes a further step toward the exclusive marketing of the process world-wide by Invensys Waste Technology (IWT). (siev)

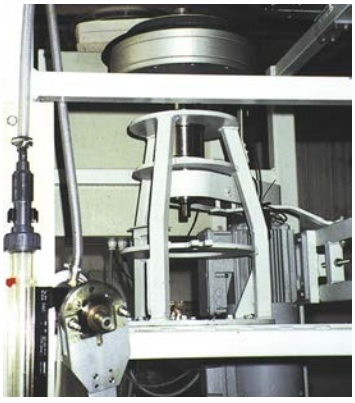
*Sewage treatment plant in Scharzfeld – a concrete application of this technology*

# Description of a Department: Particle Technology Work Group

## *What Matters is the Size*

Coal dust, wood fibres, and sugar are examples of different "particles". They are part and parcel of our natural environment: raw materials, intermediate or final products, but in certain cases also an undesired emission – such as Diesel soot.

These key words briefly outline the field of activity in the Particle Technology Work Group. Its operations are interdisciplinary, interdepartmental, and interprofessional. Size and composition of the work group are adapted to match specific projects.



*Flotation centrifuge for waste water treatment*

Common aspect of the activities is the fact that there are material properties depending on particle size, shape, or both, which must be measured, utilised, or avoided.

In the process-engineering disciplines at CUTEC, the following results, among others, have been achieved:

- For recycling, mechanical processes such as grinding, sieving, and air classification have been mutually matched, in order to separate mixtures of materials. An image processing system involving the application of a neural network for shape recognition has been developed for the same purpose.
- With measurements of the size distribution of soot particles, the reduction of the emissions from modern Diesel engines has been demonstrated.
- For waste water treatment, a centrifuge has been developed increasing the specific throughput of a classical flotation process by a factor of 100 (figure, left).
- Modern optical particle sizing instruments were shown to be well suited for online process control during the manufacture of fibre board, despite the complicated shape of wood fibres.

Research for minimising the formation of scale in boilers of power generating stations will broaden the existing field of work in the future.

In the field of sorting processes, comprehensive facilities allow operations on pilot-plant scale; moreover, various instruments are available for particle measurements. Close cooperation with the Technical University of Clausthal completes the access to specialised equipment and knowledge in an ideal way.

In view of the decreasing emission limit values and of increasing requirements on the specification of products, particle technology is an exciting field of work. (be)

# The SYNCOM®PLUS Process

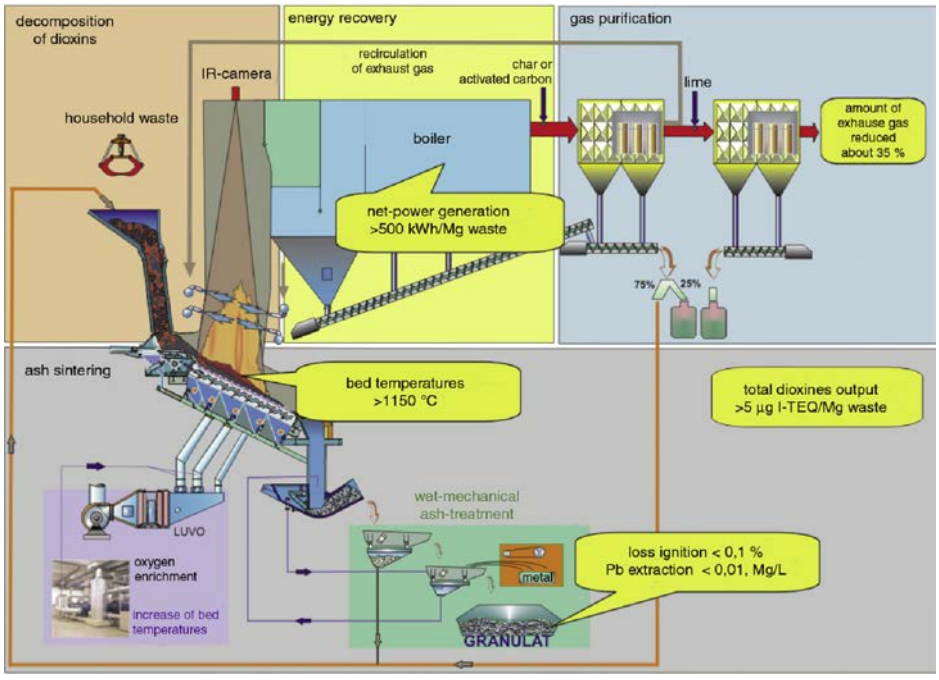
## – Energy and Inert Materials from Household Waste –

MARTIN GmbH für Umwelt- und Energietechnik (Munich) developed a process for generating power and producing inert materials from household waste. The technology is based on the applying of oxygen-enriched "synthetic" air and is therefore named as SYNCOM®PLUS process, in analogy with the term "synthetic combustion". During this process, an inert granulate is produced from the remaining grate ash, in addition to the more "traditional" generation of steam and electric power from household waste. The utilisation potential of the material is thus enhanced.

Innovations in firing technique involving a combination of oxygen-enriched primary air, recirculation of flue gas, and firing control by infra-red camera monitoring constitute the basis of the process. Higher combustion-bed temperatures are thus attained, and the grate ash is sintered as a result. Incompletely sintered fine fractions are then separated by wet-mechanical treatment steps and recycled to the firing system for completion of sintering. By means of the deslagger, the wet-mechanical treatment steps can proceed without waste water; metals are separated and can be processed for re-use.

Because of the exacting requirements on the permanency of waste-treatment systems, Japan is currently regarded as the most promising market for this new system.

Because of the high population density as well as the lack of waste-disposal areas and raw materials, treatment concepts based on the deposition of mechanically and biologically treated waste (MBA) or on simultaneous incineration in industrial plants do not represent viable solutions in Japan. In view of the favourable experience gained with the CUTEC pilot plant (illustration, below), a similar plant has also been constructed on the company premises of Mitsubishi Heavy Industries (MHI) in Yokohama. MHI is the Japanese cooperative partner of MARTIN GmbH.




The advantages of the SYNCOM® PLUS process result from the combination of a high energy yield and the production of the inert granulate. Standardised quality criteria for inert materials were specified for the first time by means of the EU Ordinance Relating to Waste Repositories at the end of 2002. The values for the granulates are decidedly lower than the specified EU limit values.

The amount of flue gas is decreased by about 35 per cent in comparison with that from conventional waste incineration plants. Consequently, no relevant gaseous emissions occur with the SYNCOM®PLUS process in combination with the well-known flue-gas purification systems. With the use of well proved components on the basis of MARTIN firing technology with the Rückschub® grate (reserve acting), the costs and risks can be minimised with this new process.

Tests have hitherto been performed at the industrial-scale pilot plant in Coburg, and the results have been confirmed at the MHI pilot plant. For optimising the wet mechanical treatment steps, comprehensive testing began at CUTEC in the summer of 2003.

In view of the favourable results, MARTIN has commissioned the conversion of the tiring equipment in Clausthal; consequently, all essential SYNCOM® PLUS process steps will be present. Test operation is expected to begin in the spring of 2004.

The development of the project to date has confirmed the many years of effective cooperation between the companies in Clausthal and Munich. (vd, da, go, wb)


*CUTEC pilot plant*


## IMPRINT

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## New in the CUTEC Team

***Laboratory Support from New CTA***

Since 1st September 2003, Michael Kratz has been supporting the Department of Physical and Biological Process Engineering, especially the work in the laboratories.

After his education as an assistant in chemical technology at the School of Chemistry and Pharmacy in Hannover, Mr Kratz was employed for several years in his professional field before coming to CUTEC. His functions at CUTEC are concentrated on the performance and checking of analyses under his own responsibility, as well as the independent supervision of tests in conjunction with research activities. (he/wes)

*Mr Kratz in his new place of work*

## Report of the Workers` Council

On 8th October 2003 a Workers` Council meeting with extensive staff participation was held at CUTEC. The Workers` Council reported on its major current activities. Besides the dedication to employee interests and requirements, the effects of the recent wage agreement and the possible introduction of a timekeeping survey were also considered in the report. Furthermore, the Workers` Council recommended the implementation of apprenticeships in the mechanical workshop and in the analytical laboratory. In his talk, Prof. Carlowitz emphasised the encouraging business trends at CUTEC in 2003 and predicted a similar good result for the coming year. Moreover, the strategy of enhanced support for the operative departments will be continued. (schr)

## We congratulate ...

... Prof. Dr. Sven Klaus, who has accepted an appointment as Professor of Computer Science at the University of Applied Sciences in Mannheim on 1st September 2003. We wish him all the best for his professional career. He has been employed at CUTEC since 1996 and worked in the Department of Data Processing Systems, Graphics, and Media Technology. (he)

## Joint Procuration to Dr. Vodegel

*Dr. Stefan Vodegel – second proxy at CUTEC*

Dr. Stefan Vodegel has been employed at CUTEC since 1st April 2003 and is Head of the Department of Thermal Process Engineering.

During its meeting on 21st August 2003, the Board of Directors of CUTEC resolved to confer joint procuration to Dr. Vodegel.

The term procuration designates a commercial form of proxy, as specified in the BGB, which can be conferred as single or joint procuration. In the case of joint procuration, both proxies – Mr Sommer and Dr. Vodegel – assume the authority jointly. (he/wes)

## Scientific Advisory Board at CUTEC: Prof. Dipl.-Ing. Dr. Anton Friedl – A Profile

Prof. Dipl.-Ing. Dr. Anton Friedl is a professor extraordinarius at the Technical University of Vienna, where he began his scientific career with a major course of study in chemical engineering in 1978. After completing his doctoral dissertation in 1990, as well as various activities abroad, he was appointed director of a working group, "Thermal Process Engineering" in 1991. He served as a university lecturer in this field and was appointed as "Außerordentlicher Universitätsprofessor" (Professor Extraordinarius at the University). After a period of industrial employment, he resumed his research and teaching activities in process engineering at the Technical University of Vienna in 1999. He was appointed head of the newly established Department of Thermal Process Engineering and Simulation in 2002. His scientific work has already been distinguished by several awards and documented by more than 110 publications. From CUTEC publications as well as personal contacts at various scientific events, he has been familiar with our institute for several years. In 2002, has was appointed to the Scientific Advisory Board of the institute.

Upon being asked about future strategy, he answered: "For the future, it will be especially important for CUTEC to optimally utilise the potential which results from its position as an interface between the University and the economy." (he)

*Prof. Dipl.-Ing. Dr. Anton Friedl*

## DATES

- CUTEC Presentation at ENERGY Hannover Industrial Fair from 19th to 24th April 2004 in Hannover